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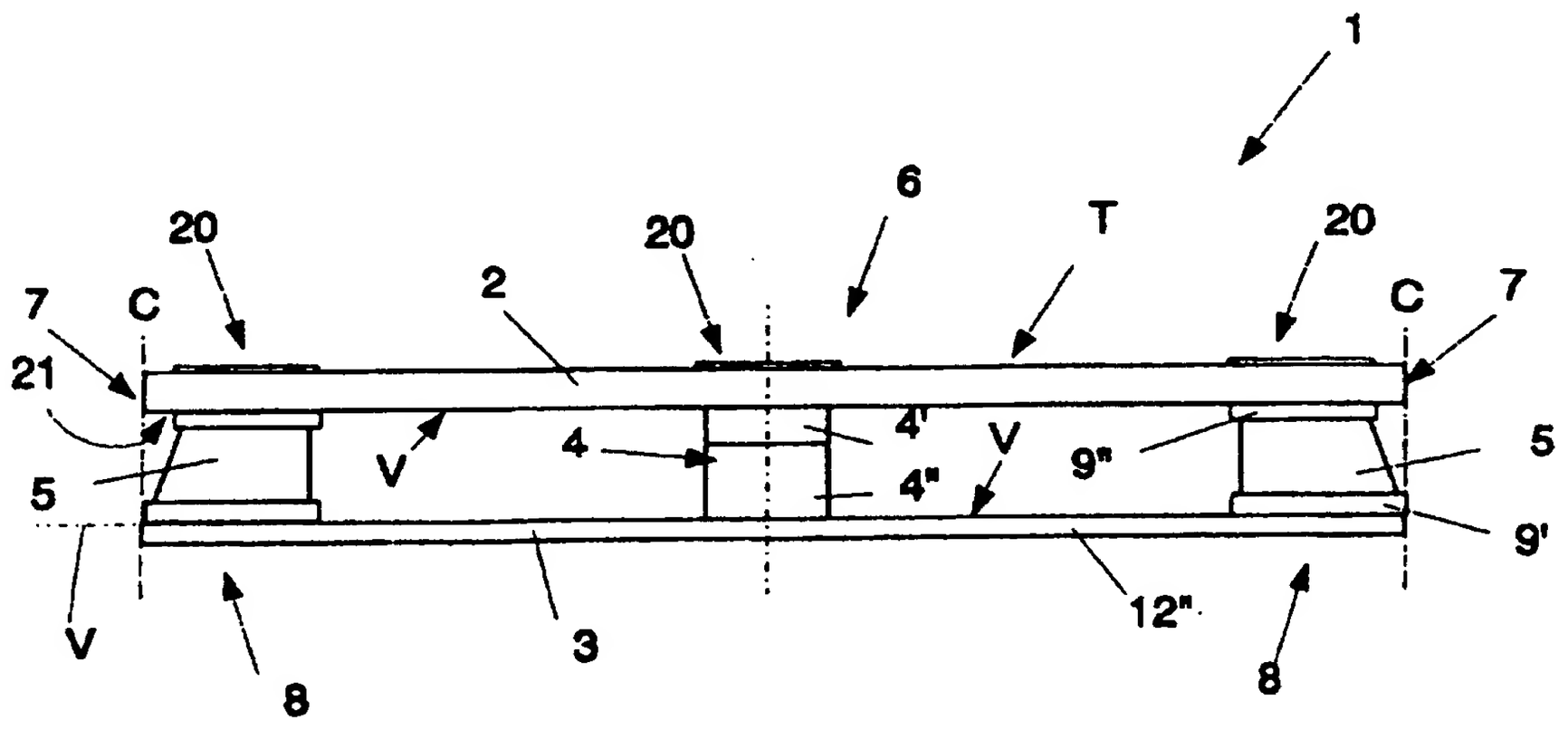

(57) Abstract

A plastic pallet, comprising a substantially rectangular top deck (2), a substantially rectangular bottom deck (3) and a series of connecting devices to be referred to as blocks, connecting the top deck to the bottom deck, a series of blocks (5) being fitted adjacent the corners of the decks as corner blocks and the other blocks (4) being spaced from the corner blocks as intermediate blocks, and a number of the blocks being detachably connected to the two decks and being exchangeable for similar blocks, at least a number of the intermediate blocks being fixedly connected to the two decks and at least the corner blocks of the pallet being of detachable construction.

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Title: Plastic pallet having detachable blocks and method of manufacturing such pallet.

The invention relates to a plastic pallet according to the preamble of claim 1. Such a pallet is known from European patent application 0 583 796.

The known pallet consist of a rectangular top deck, a likewise rectangular bottom deck and a number of blocks connecting the two decks. These blocks are of such construction that they are detachable from the decks and can be replaced by other blocks, for instance when one of the blocks gets damaged. Such damages can occur easily, for instance during the maneuvering of fully loaded pallets by means of a pallet truck or forklift truck. After all, in particular when the scoops of such a vehicle are being inserted or withdrawn, there is a great chance that one or more blocks are hit and pushed out of joints, smashed, or completely knocked out of the pallet. Moreover, there is a chance that the pallet is driven against an obstable, for instance an adjacent pallet. This also involves the chance of damage to the pallet(s), in particular to the blocks.

In the known pallet, all blocks are detachably connected to the two decks. This means that the two decks can come off the pallet entirely. This renders the blocks readily changeable, but the construction of this known pallet is such that the stiffness of the pallet is insufficient. It is true that the detachable blocks are sufficiently able to take up pressure forces and to transmit them from the top deck to the bottom deck, but particularly bending forces can be taken up insufficiently by the pallet. Of course, this can be

compensated for by extra material and specific design, for instance in the form of stiffening ribs under or above one or both decks, but this has the drawback of rendering the pallet heavier and more voluminous, and moreover costlier in manufacture and use. A further drawback of the known pallet is that when the pallet is picked up, there is a chance that the decks and blocks are separated completely from each other, for instance when the bottom deck gets stuck behind a top deck of an adjacent pallet. In particular, the two decks can be pressed apart and from the blocks when a pallet hand truck is used. This may render the pallet unusable and, moreover, involves the chance that the picked-up portion of the pallet tilts when it is put down again elsewhere, causing the load to fall from the pallet and become damaged or even completely lost.

The object of the invention is to provide a plastic pallet of the type described in the preamble of the main claim, wherein the drawbacks of the known pallet are avoided while the advantages thereof are maintained. To that end, a plastic pallet according to the invention is characterized by the features of the characterizing part of claim 1.

An important advantage of a pallet according to the invention resides in the positioning of the or each fixed block. When pallets are used, in general only or mainly the corner blocks are damaged, for instance when the scoops of a forklift truck are carelessly inserted between the decks. Generally, the middle blocks are spared, in particular a central block. The decks of a pallet according to the

invention are fixedly interconnected by the or each fixed block, spaced from the corners of the pallet. The or each fixed block contributes greatly to the stiffness of the pallet, while the or each fixed block is well protected against damage. Moreover, the or each fixed block prevents the decks from becoming completely separated from each other. This ensures that even if one of the detachable blocks should come loose because one of the decks is deformed or the block is damaged, the pallet substantially retains its shape. This has as a result that the load of a pallet is in a suitable and simple manner prevented from getting damaged or even lost when the pallet is picked up and put down.

A pallet according to the invention is easy to manufacture, for instance through injection molding of the decks and blocks, is stiff and firm in relation to its weight and volume, is easy to maintain and repair, is relatively cheap and is particularly handy and safe in use.

In an advantageous embodiment, a plastic pallet according to the invention is characterized by the features of claim 2.

By fixedly connecting at least the blocks that are spaced from the outside contour of the pallet to the two decks, the advantage is achieved that at least a number of the blocks adjacent the contour of the pallet, which are in principle the most susceptible to damage caused by for instance lifting tools or collisions, are exchangeable. By fixedly connecting blocks adjacent the center of the pallet to the decks, a proper stiffness of the pallet is attained at a proper repairability and flexibility of the pallet.

In a first preferred embodiment, a pallet according to the invention is characterized by the features of claim 3.

Positioning of the fixed blocks adjacent the central area of the sides of the pallet offers the advantage that a pallet in this embodiment has a very great stiffness, while the most vulnerable blocks are and remain readily exchangeable. Moreover, the pallet can still be picked up properly with for instance a forklift truck.

In an alternative embodiment, a pallet according to the invention is characterized by the features of claim 4.

In this embodiment, all blocks located adjacent the outside contour of the pallet are of exchangeable construction and all other blocks are for instance fixed. Thus, a relatively rigid pallet is obtained which is moreover firm and relatively light, while a great flexibility is maintained and the pallet is properly repairable.

The use of pallets regularly involves the use of wrapping foil or shrink foil for wrapping up the load thereon and securing it to the pallet. To enable this foil to be suitably fixed to the pallet, a pallet according to the invention is characterized by the features of claim 8.

The longitudinal edge, receding from the outside contour of the pallet, of at least the corner blocks, which corner blocks are preferable detachable, offers the advantage that the foil can easily be attached under the longitudinal edge of the top deck and will not slide from the blocks and come off the pallet, while the foil need not be provided below the bottom deck. This means that less foil is needed and,

moreover, that all insertion openings for the scoops of a forklift truck or the like remain open. Moroever, the (full) pallet need not be picked up for removing the foil. Different pallets can be disposed closely together without involving any problems caused by for instance parts extending outside the rectangular contour of the pallet. Precisely by constructing the detachable corner blocks so as to be receding, the additional advantage is achieved that the chance that juxtaposed pallets may get stuck behind each other when one of the pallets is picked up, or assume an oblique position when it is put down, is considerably reduced. After all, the inclined faces of the blocks provide a proper guidance if the blocks should contact one another.

In an advantageous embodiment, a pallet according to the invention is further characterized by the features of claim 12.

When the scoops of a forklift truck or a like lifting means are being inserted between the decks and the blocks of a pallet, there is a risk of the pallet getting damaged thereby. Designing the corner blocks in a color different from that of the decks makes it considerably easier for the user of the forklift truck to aim the scoops or the like, so that the risk of damage to the pallet is reduced. As these blocks are of detachable design, separate color adjustment is possible in a simple manner.

With the known pallet, the core of each detachable block extends through the two decks and is fastened therein with snap fingers. Hence, on each side of the detachable block, the

core extends outside the block proper over a length approximately corresponding to the thickness of the deck. When this known pallet is assembled, all blocks should first be inserted into one deck, and only then can the opposite deck be fitted. When a block is to be removed, almost the entire pallet should in principle be disassembled again or the two decks should be pulled apart relatively far, which means that the decks can be relatively little stiff. Hence, such a pallet is complicated and costly in production and maintenance and/or relatively little stiff. Further, the core forms an open connection between the top and bottom sides of the pallet, which is disadvantageous because of, for instance, accumulation of dirt in the hollow core. Moreover, the known pallet requires holes in top and bottom decks for mounting the blocks, which holes at least reduce the firmness and stiffness of the decks and hence of the pallet. In order to avoid these drawbacks, a pallet according to the invention is in further elaboration characterized by the features of claim 13.

In this embodiment of the pallet according to the invention, the detachable blocks can be positioned and removed individually, without this requiring disassembly of the entire pallet. Moreover, the block is confined between the decks, so that the risk of dirt accumulation is largely eliminated.

In a particularly advantageous embodiment, a pallet according to the invention is characterized by the features of claim 16 and/or 17.

In such an embodiment, a block can be simply slid between the decks from one side, and when the block is pushed through,

the relevant corners of the decks are automatically pushed apart. Only when the block has arrived at the suitable position will the deck corners rebound and is the block clamped between the decks.

In a further particularly advantageous embodiment, a pallet according to the invention is characterized by the features of claim 18.

During use, other forces are exerted on the decks than on the blocks. For that reason, it is particularly advantageous if the blocks are for instance manufactured from a material which is impact-resistant, while the decks preferably have a high stiffness and nevertheless some elastic deformability, at least in the corners. In particular in the case of static load, the stresses occurring in the blocks are lower than those in the decks, so that pressure forces can be taken up more easily than bending forces. Hence, for the blocks a material can be used of a low modulus of elasticity and a lower yield point than for the decks. For the blocks, the impact resistance is of greater importance so as to be able to take up shock loads from, for instance, scoops of a forklift truck. In this connection, it is particularly advantageous if the decks are manufactured from, for instance, recycled plastic such as plastic (beer) crates and the like. This is advantageous in particular for environmental and economical reasons. It is preferred that at least the detachable blocks be manufactured from plastic which is relatively environmentally friendly, because they will be lost and/or

have to be replaced more often than the decks. In this embodiment, the environment is burdened minimally.

The invention further relates to a method of manufacturing a plastic pallet, which method is characterized by the features of claim 20. In such a manner, a plastic pallet according to the invention can be manufactured and repaired or maintained in a simple and economical manner.

Further elaborations of a pallet or method according to the invention are described in the subclaims and the specification.

To explain the invention, exemplary embodiments of a pallet and method will be described hereinafter, with reference to the accompanying drawings, wherein:

Fig. 1 is a side view of a pallet according to the invention, in assembled condition;

Fig. 2 is a perspective view of a corner of a bottom deck of a pallet according to the invention, having one detached corner block;

Fig. 3 is a schematic side view of a first alternative embodiment of a corner portion of a pallet according to the invention;

Fig. 4 is a perspective view of a pallet according to the invention, with a ribbed structure, partly shown, of the top deck;

Fig. 5 is a schematic, perspective view of a second alternative embodiment of a corner portion of a pallet according to the invention; and

Fig. 5A is a schematic, perspective view of a further alternative embodiment of a corner portion of a pallet according to the invention.

Fig. 1 is a side view of a pallet 1, comprising a top deck 2, a bottom deck 3, a number of fixed center blocks 4 connecting the two decks, and a number of detachable corner blocks 5 which also connect the two decks 2, 3 during use. In the embodiment shown, the pallet 1 in top plan view (Fig. 4) has a rectangular shape, while the top deck 2 and bottom deck 3 have identical dimensions and are disposed one right above the other.

The top deck 2 is manufactured through injection molding or a like manufacturing technique, and adjacent the middle points 6 of the sides 7 and in the center of the top deck, on the bottom side thereof during use, a first part 4' of a fixed block 4 is in each case formed integrally therewith. The bottom deck 3 is manufactured in a similar manner and is each time provided, at the same positions, with the other part 4" of a fixed block 4, on the side facing upwards during use. When the decks 2, 3 are placed on top of each other, the block parts 4', 4" lie on top of each other and keep the two decks 2, 3 at the desired distance relative to each other. By means of a suitable connecting technique, the block parts 4', 4" are inseparably interconnected by their facing surfaces or edges. For that purpose, the parts are preferably interconnected utilizing a welding technique. However, other connecting techniques are also possible, such as glueing or

screwing. In this manner, top deck 2 and bottom deck 1 form one whole.

The top deck 2 is substantially composed of intersecting ribs 11 so that approximately rectangular openings are each time included between the ribs 11. This produces a light, stiff construction. In the exemplary embodiment shown, the ribs 11 extend approximately parallel to the sides 7 of the decks 2, 3, but it is also possible that the or a number of ribs extend for instance in diagonal direction of the or each deck 2,3, thus increasing the stiffness of the relevant deck in the diagonal direction. Moreover, differently shaped ribs can be used, for instance to form a honeycomb structure having hexagonal openings, or for instance having triangular openings. Continuous ribs have the advantage that they can transmit stresses in a very suitable manner, which is of great advantage to the strength and rigidity of the deck. Further, one or two closed decks can be used. The choice for a structure of the decks depends on, inter alia, the desired stiffness and strength properties, the allowable weight of the pallet, the material used, the desired deformation characteristics, an optionally desirable open structure and other factors. In the exemplary embodiment shown, the bottom deck 3 is substantially formed by a plate part 12 having four openings distributed over four quadrants. Hence, the plate part 12 in fact comprises six beam parts, three first beam parts 12' extending parallel and regularly spaced apart in a first direction (in Fig. 1 perpendicularly to the plane of the drawing) and three second beam parts 12" extending parallel

and regularly spaced apart in a direction at right angles to the first beam parts (in Fig. 1 parallel to the plane of the drawing). The outer two first beam parts 12' and two second beam parts 12" define the outer circumference of the bottom deck 3. Such a deck is usually referred to as a "cross window frame".

On the facing sides during use, the top deck 2 and bottom deck 3 are provided, adjacent the four corners 8 thereof, with a retaining edge 9', 9", closed on all sides and each including an approximately rectangular recess 10', 10". In the bottom deck 3, each recess is provided near an intersection of two beam parts 12 and the retaining edge 9' lies on two sides parallel to and in line with the outer longitudinal wall of the bottom deck 3, in the top deck 2 the retaining edge 9" lies entirely at some distance from the side 7 thereof. The sides 7 of the top deck 2 and bottom deck 3 substantially define the outside contour C of the pallet. The recesses 10', 10" are always disposed in pairs directly opposite each other. In this context, a recess should be understood to mean a space which is at least substantially defined by a bottom 13 and a longitudinal wall 9, and the bottom 13 may lie above, level with or below the plane V of the top deck or bottom deck, which plane faces the opposite deck. Accordingly, the longitudinal wall 9 may or may not extend entirely or partly outside that plane V in a direction approximatly at right angles to that plane V. Moreover, the bottom 13 may be of a flat design or be profiled.

The detachable corner blocks 5 (Fig. 2) are block-shaped, have a closed longitudinal wall 14 and two end faces 15 extending approximately parallel to each other and at right angles to the longitudinal axis L of the block 5, which end faces are defined by the longitudinal edges 17 of the longitudinal wall 14 and the top and bottom sides respectively of stiffening ribs 27 extending within the longitudinal wall 14. At least two sidewall parts 16 of the corner blocks 5 incline in the direction of the longitudinal axis L so that the surface area of the top end face 15' of each corner block 5 is smaller than the bottom end face 15". The longitudinal edges 17 of the longitudinal wall 14 comprise snap fingers 18 or like snap means, adapted to cooperate with snap means such as a snap edge or (in the embodiment shown) snap openings 19 in the retaining edges 9', 9" of the recesses 10', 10". The dimensions of the first recess 10' in the top deck correspond to the dimensions of the top end face 15' of a corner block 5, those of the second recess 10" with the dimenions of the bottom end face 15". Both the top deck 2 and the bottom deck 3 are closed above and below the blocks 4, 5 respectively. This has as an advantage that mud and dirt, such as for instance glass splinters and the like, are prevented from being collected in the blocks. This improves the hygiene and moreover increases the safety for users.

A pallet 1 can be assembled as follows.

The assembly, composed of a top deck 2 and a bottom deck 3 intimately interconnected by five fixed center blocks 4, is

for instance laid down flat on a work face. Then, the opposite corners of the bottom deck 3 and the top deck 2 are slightly pulled apart, approximately over a distance corresponding to twice the height of the longitudinal edge 9 of the recesses 10 provided in the relevant corners. This deformation is preferably completely elastic. It is generally preferred that the pallet be assembled upside down, the bottom deck 3 being less stiff than the top deck 2. Then, a corner block 5 is slid upright between the two corners, in between the longitudinal edges 9 and with the inclined sidewall parts 16 facing outwards. The corner block 5 is pressed through so far that the two end faces 15', 15" slip into the two recesses 10', 10" or are at least received within the longitudinal edges 9', 9" thereof. The corners of the two decks 2, 3 can then rebound into the original position, while the snap means 18 of the corner block 5 and the snap means 19 of the recesses 10 can be brought into engagement. Accordingly, the corner block 5 is connected in a positionally fixed manner to the two decks 2, 3 and is perfectly capable of taking up the forces occurring during use, which will mainly be pressure forces. Likewise, the other three corner blocks 5 are fitted. Mounted on the top face of the top deck 2 is one large or (as shown in Fig. 4) a number of small slip-resistant mats 20, preferably through attachment on the closed top ends of the blocks 4, 5. The slip-resistant mats can for instance be pressed onto the top deck, if necessary under local heating. It is also possible to choose for glueing, provided that this is feasible in terms of

production technology and economy. After that, the pallet is ready for use.

Fig. 3 shows an alternative embodiment of a corner block 5 and a corner 8 of a pallet 1 wherein the corner block 5 is to be inserted. In this embodiment, the corner block is wedge-shaped. The longitudinal edges 9', 9" slope downwards and upwards respectively in the direction away from the side 7, which means that on the side remote from the side 7, the longitudinal edges 9' 9" always have a maximum height and a minimum distance relative to each other. During insertion of a corner block 5, the low side 23 thereof, in front position, is placed near the side 7 between the parts of the longitudinal edges 9', 9", which parts are maximally spaced apart in the starting position, whereupon a force F is exerted on the high rear side 24 of the corner block 5 in the direction of the high parts of the longitudinal edges 9', 9". As a result, the corner block 5 is displaced in the direction of force, while the corner parts 8 of the top deck 2 and the bottom deck 3 are pressed apart relatively to each other in the direction M. Owing to the increasing height of the block 5, the corner parts 8 are pressed apart further and further, long enough to enable the highest part 24 to pass the low longitudinal edge parts and the ends 15 of the block 5 to be received in the recesses 10. The corner parts 8 then rebound and the snap means 18, 19 are brought into securing cooperation. Such an embodiment permits positioning of the blocks in a particularly simple manner, without special tools, without much force and also without the entire pallet having to be disassembled.

A pallet according to the invention can be used as follows.

On the pallet 1, material is stacked, for instance boxes, crates, bottles or the like. In many cases, this material is wrapped with a foil to prevent the material from falling and being damaged. For this purpose, wrapping foil or shrink foil can for instance be used. The foil is wound along the outer longitudinal edge of the top deck and secured therebelow. This is rendered possible because adjacent the top side, i.e. at the top deck 2, the blocks, in particular the corner blocks 5, are spaced from the outside contour C of the pallet. Hence, when the pallet is wrapped with the foil, the foil can be tightly secured along at least a part of the bottom side of the top deck, in particular below the projecting corner edge 21.

The scoops of a forklift truck, a pallet truck or a like lifting device, are inserted into the insertion spaces 22 between the top deck 2, the bottom deck 3 and in each case a corner block 5 and a center block 4, whereupon the pallet with or without load can be picked up and displaced. If, for instance during insertion of the scoops, a corner block 5 is damaged, for instance because the driver of the lifting device maneuvers awkwardly, it may loose its supporting function completely or partly. In that case, the detachable corner block 5 can be removed and replaced by a comparable block 5. For that purpose, the corner of the top deck 2 is pulled away relatively to the corner of the bottom deck 3, while the snap means 18, 19 are brought out of engagement. Then, the broken

block 5 is removed from the recesses 10', 10" and replaced in the manner described hereinabove by a new or at least undamaged corner block 5. The rebound of the corners causes the block 5 to be wedged again and the renewed pallet is ready for use.

Empirical research has shown that the majority of damages to in particular plastic pallets concern the corner blocks. Because in a pallet according to the invention, only the corner blocks are rendered replaceable and the center blocks are of a fixed construction, a highly stiff yet light pallet is obtained, while the damages that occur, viz. damages to the corner blocks, can in most cases be easily repaired. As a result, during the manufacture, at least material and manufacturing time are saved, the use of the pallets becomes easier because the pallets are less heavy and take up less volume, so that, moreover, storage space and energy are saved. The simple maintenance further yields a saving in tools and time.

In the embodiments shown, single detachable corner blocks are in each case involved. However, it is also possible to render several or even all blocks located adjacent the outside contour C of the pallet exchangeable and to make for instance only one or the central block, which is spaced from all longitudinal edges, of a fixed construction. Such a pallet, when otherwise of a comparable construction, is perhaps less stiff than the above-described embodiments, but stiffer than the known pallet and is repairable in more cases of damage than the embodiments shown.

A further advantage of a pallet according to the invention is that the entire pallets need to be replaced less frequently. After all, in most cases, the pallet can easily be repaired in the event of damages, while damages will occur less frequently, because not every block which becomes detached has to get damaged. In a particularly advantageous embodiment, the decks 2, 3 and the fixed blocks are manufactured from for instance plastic from recycled crates such as beer crates. This plastic may contain substances which are unfriendly or even harmful to the environment, such as softening agents, blowing agents or heavy metals such as lead or cadmium. Since the chance that an entire assembly of two decks gets lost in an uncontrolled manner is small, in view of the dimensions, environmental damage upon destruction of the pallets can easily be minimized, while moreover records can easily be kept of the plastics used and the pollution present therein. The detachable blocks are preferably manufactured from an environmentally friendly, preferably readily recyclable plastic. Preferably, this plastic used for the detachable blocks is moreover properly resistant to pressure forces and impact-resistant, while the decks should in particular have bending stiffness. The chances of detachable blocks disappearing unintentionally, for instance because they come loose during transportation, are not entirely negligible. As these blocks do not comprise any components which are highly environmentally harmful and which are for instance subjected to a recording system, this is little harmful from an environmental point of view. Moroever, no recording system

or a very particular and expensive waste processing system needs to be set up or involved.

It is preferred that the detachable blocks, in particular the corner blocks, be designed in a color different from that of the decks, for instance a contrasting color. This renders it easier for the driver of the lifting device to maneuver the scoops into the insertion openings 22 without damaging the blocks 5. As the detachable blocks 5 are manufactured separately from the decks 2, 3, a difference in color can be realized in a particularly simple manner.

In an embodiment shown in Fig. 5, the corner blocks 5 are of such design that a portion 26 thereof is located in or on the top face T and/or along the side 7 of the top deck 2 or is at least visible at that location. This offers the advantage that during use, the position of the corner blocks 5 is even better visible to for instance the driver of a lifting device. In this connection, the top part 15' of the detachable corner block 5 may form a part of the corner 8 of the top deck 2, while for instance laterally insertable snap means 18, 19 may be fitted in the corner block and the top deck or snap means described hereinabove may be used.

Fig. 5A shows an embodiment of a pallet according to the invention wherein a corner block 5 can be secured by means of a V-shaped wedge part 25 extending in a slot of a likewise V-shaped section. The corner block 5 is on two opposite sides provided with such a wedge part 25 and is readily insertable between the decks through sliding, with the top side of the wedge part remaining visible on the top side of the pallet. If

necessary, additional means, such as the snap means described hereinabove, can be provided for anchoring the corner block between the decks 2, 3 so as to be positionally fixed.

The invention is by no means limited to the embodiments given in the drawings and the specification. Many variations thereon are possible. For instance, the corner blocks may be approximately cube-shaped or at least block-shaped, having only right angles and, during use, vertical walls, or the blocks may for instance be hourglass-shaped or be composed of two truncated pyramids having facing apices. Such blocks have the advantage of being symmetrical and therefore easier to insert, because they can be used upright and upside down. Moreover, the blocks may for instance by rotation-symmetrical or polygonal. Many forms are possible. The detachable blocks may be fastened to the decks in other manners, for instance through mortise and tenon joints, clamping, snap edges or other detachable fastening means. Further, parts of the or each fixed block may optionally be interconnected permanently in a manner other than is described, for intance through snap means, screwing means and the like. A pallet according to the invention may have a different top deck and/or bottom deck, for instance entirely or more closed, while the two decks may be identical or, by contrast, have different dimensions and/or shapes. Also, the top and bottom decks may be manufactured in a different manner, for instance in several parts or together as one part. A pallet according to the invention may have various dimensions, depending on for instance the intended use. These and comparable modifications are considered to fall

within the purview of the invention.

CLAIMS

1. A plastic pallet, comprising a substantially rectangular top deck, a substantially rectangular bottom deck and a series of connecting devices to be referred to as blocks, connecting the top deck to the bottom deck, a series of blocks being fitted adjacent the corners of the decks as corner blocks and the other blocks being spaced from the corner blocks as intermediate blocks, and a number of the blocks being detachably connected to the two decks and being exchangeable for similar blocks, **characterized in that** at least a number of the intermediate blocks (4) are fixedly connected to the two decks (2, 3), whilst at least the corner blocks (5) of the pallet (1) are of detachable construction.

2. A plastic pallet according to claim 1, characterized in that the or each center block (4), located adjacent the center of the pallet (1) at a relatively large distance from the side edges (7) thereof, is fixedly connected to the top deck (2) and the bottom deck (3).

3. A plastic pallet according to claim 1 or 2, characterized in that only the corner blocks (4) are of detachable construction.

4. A plastic pallet according to claim 1 or 2, characterized in that all blocks adjacent the longitudinal edges (7) of the pallet (1) are detachable.

5. A plastic pallet according to any one of the preceding claims, characterized in that at least one of the decks (2, 3) is substantially formed from intersecting ribs (11) forming an

open lattice structure, whilst at least during use the blocks (4, 5) are closed at least on the sides facing the decks (2, 3).

6. A plastic pallet according to claim 5, characterized in that during use, the blocks (4, 5) are closed on all sides.

7. A plastic pallet according to claim 5 or 6, characterized in that at least one of the decks (2, 3) comprises, on the side (T) facing away from the blocks (4, 5), slip-resistant means (20) which are at least attached to a number of the closed ends of the blocks (4, 5).

8. A plastic pallet, comprising a substantially rectangular top deck, a substantially rectangular bottom deck and a series of connecting devices, to be referred to as blocks, connecting the top deck to the bottom deck, a series of blocks being fitted adjacent the corners of the decks as corner blocks and the other blocks being spaced from the corner blocks as intermediate blocks, and a number of the blocks being detachably connected to the two decks and being exchangeable for similar blocks, the top deck and the bottom deck having substantially identical dimensions and being disposed one right above the other, in particular according to any one of the preceding claims, characterized in that at least the sides (14) facing outwards during use, of at least the corner blocks (5) comprise a face (16) inclining inwards in the direction of the top deck (2), so that the outside of the corner blocks (5) approximately touches the outside contour (C) of the pallet at the level of the bottom deck (3) and

is staggered inwards relative to the contour (C) of the pallet at a distance from the bottom deck (3).

9. A plastic pallet according to claim 8, characterized in that the outer surface (14) of at least the corner blocks (5) is spaced from the contour (C) of the pallet (1) adjacent the top deck (2).

10. A plastic pallet according to claim 8, characterized in that the outer surface (14, 16) of at least the corner blocks (5) touches the outside contour (C) of the pallet (1) at the level of both the bottom deck (3) and the top deck (2), while said blocks (5) are constricted adjacent a center part.

11. A plastic pallet according to any one of the preceding claims, characterized in that during use in a pallet (1), at least a number of the detachable blocks (5) form at least a portion (15; 25; 26) of the top deck (2) and/or the bottom deck (3).

12. A plastic pallet according to any one of the preceding claims, characterized in that the corner blocks (5) have a color which at least differs from the color of at least one of the decks (2, 3) of the pallet (1).

13. A plastic pallet according to any one of the preceding claims, characterized in that each deck (2, 3) is for each detachable block (5) provided with a recess (10) or comparable space, surrounded by a retaining edge (9), wherein at least an end face (15) of a detachable block (5) is fittingly receivable, while in each case two recesses (10', 10") are located opposite each other, the height of the detachable block (5) being such that it can be clamped between the

bottoms (13) of the relevant opposite recesses (10) in a position wherein it is retained by the retaining edges (9) against shifting, the corners (8) of the decks (2, 3) being elastically deformable so that when the corners (8) of the decks (2, 3) are moved apart, a detachable block (5) is removable and, after the positioning of a detachable block (5) between the two recesses (10', 10") and the release of the decks (2, 3), the detachable block (5) is clamped by the decks (2, 3).

14. A plastic pallet according to claim 13, characterized in that the or each detachable block (5) and the longitudinal edges (9', 9") of the recesses (10', 10") cooperating therewith during use comprise snap means (18, 19), such as snap fingers and/or snap edges, which cooperate for securing the relevant block (5).

15. A plastic pallet according to claim 14, characterized in that the snap means (18) are provided on the or each detachable block (5) near or along the longitudinal edges (14) of the end faces (15).

16. A plastic pallet according to any one of claims 13-15, characterized in that the or each detachable block (5) is of wedge-shaped design so that during use, when a detachable block (5) is being slid between the two decks (2, 3), the corners (8) of the decks (2, 3) are pressed apart by the block (5) and can return into their starting positions only after the block (5) has been received in the recesses (10', 10").

17. A plastic pallet according to any one of claims 13-16, characterized in that the longitudinal edge (9) of the recesses (10) slopes upwards in at least one direction in the direction away from the outside contour (C) of the pallet (1), so that during use, when a block is being slid between the two decks (2, 3), the corners (8) of the decks (2, 3) are pressed apart by the block (5) and can return into their starting positions only after the block has been received in the recesses (10).

18. A plastic pallet according to any one of the preceding claims, characterized in that the decks (2, 3) and/or the fixed blocks (4) are manufactured from a material different from at least a number of the detachable blocks (5).

19. A plastic pallet according to claim 18, characterized in that the decks (2, 3) and/or the fixed blocks (4) are manufactured from recycled plastic, in particular plastic of recycled crates such as beer crates and the like, while the detachable blocks (5) are preferably manufactured from relatively ecologically sound, preferably biodegradable plastic.

20. A method of manufacturing a plastic pallet according to any one of the preceding claims, wherein at least the top deck (2) and/or the bottom deck (3) are injection-molded, each deck (2, 3) comprising at least a part (4', 4") of at least a number of the fixed blocks (4), the decks (2, 3) being placed on top of each other in such a manner that the corresponding parts (4', 4") of the fixed blocks (4) rest against each other, whereupon the parts of the fixed blocks (4) are fixedly

interconnected at the level of the contact surfaces, for instance through glueing or welding, so that the two decks (2, 3) extend approximately parallel to each other and are fixedly interconnected via said fixed blocks (4), whereupon the detachable blocks (5) are contiguously retained between the decks (2, 3).

21. A method according to claim 20, characterized in that the detachable blocks (5) are placed between the decks (2, 3) by sliding them in from one side (7) and snapping them home in recesses (10', 10") intended therefor.

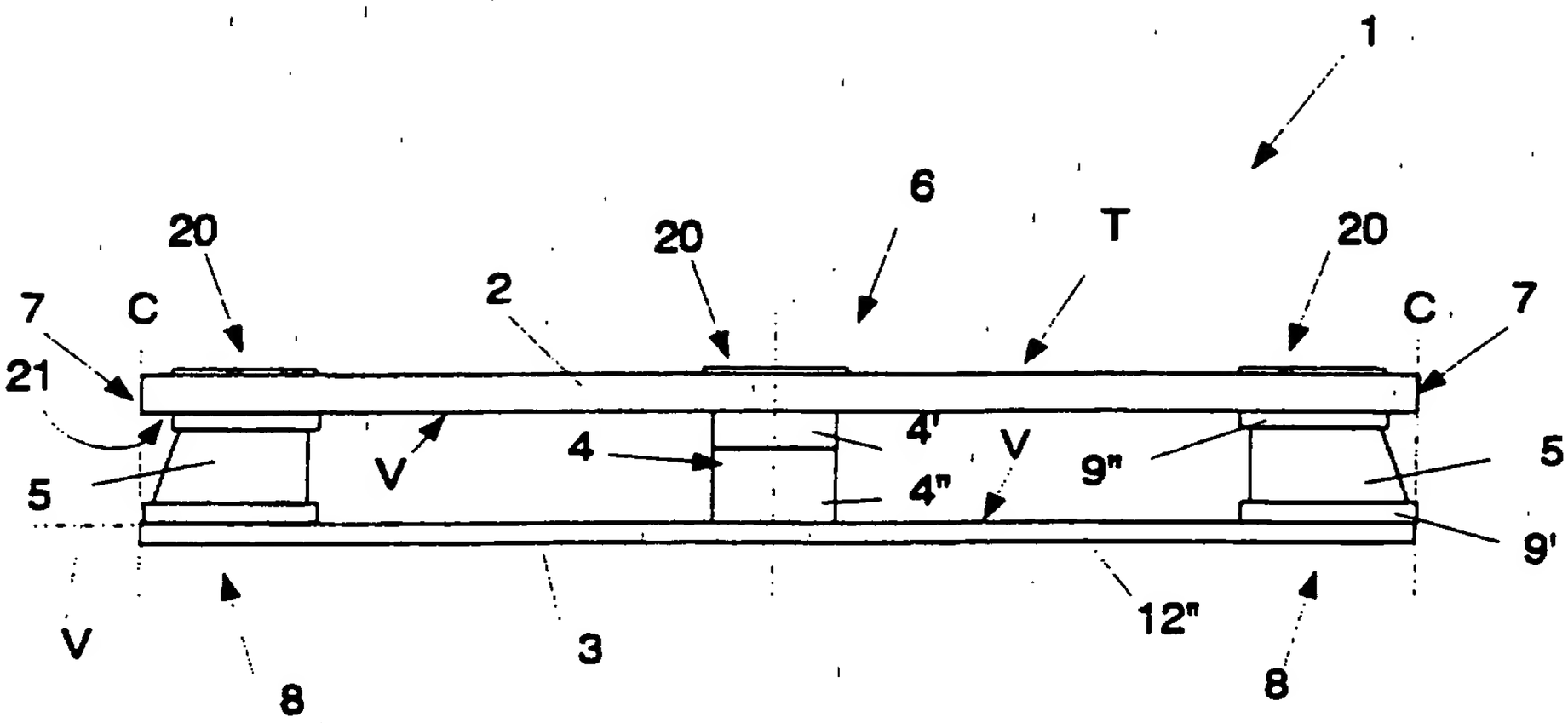

Fig. 1

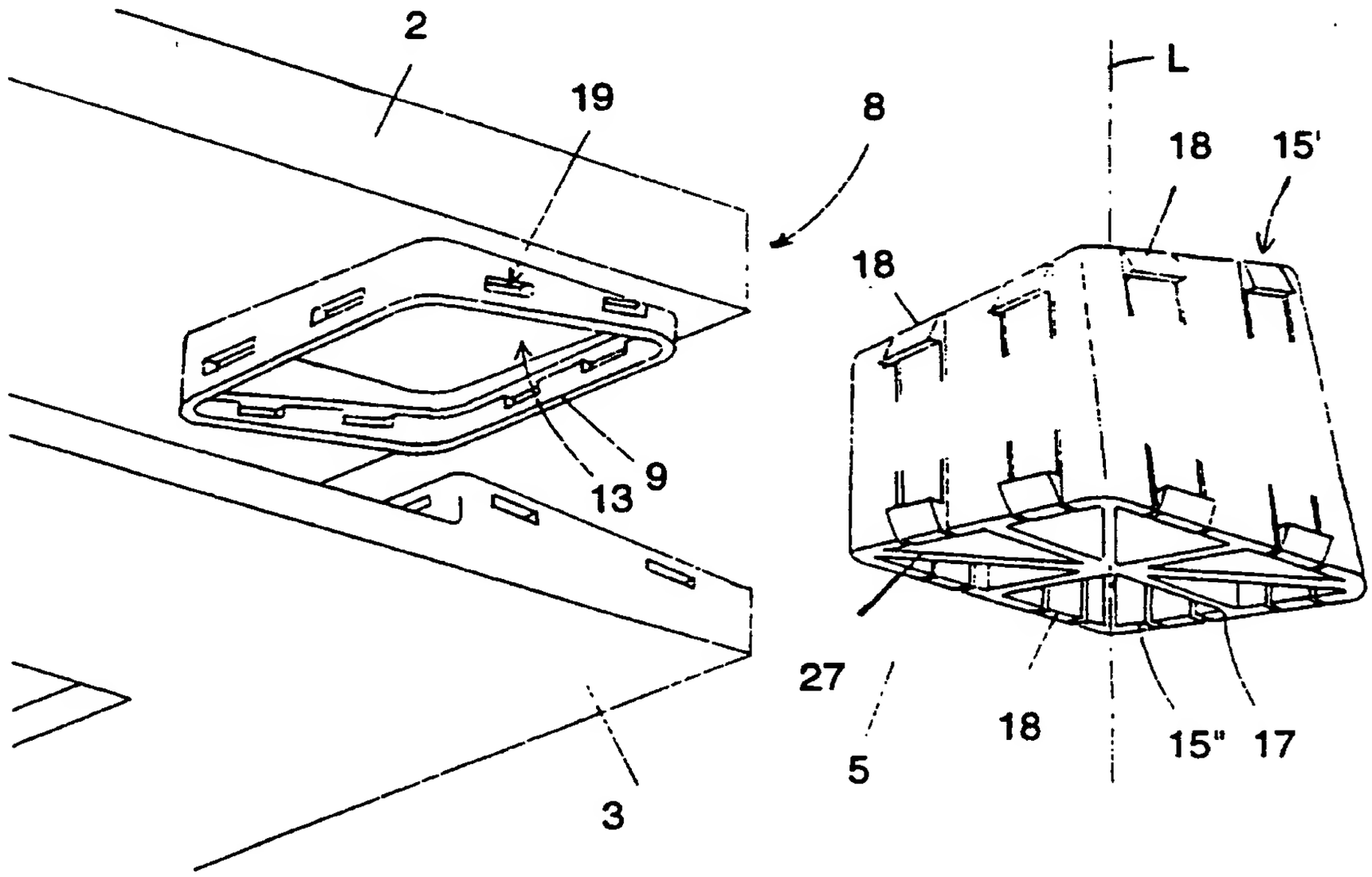

Fig. 2

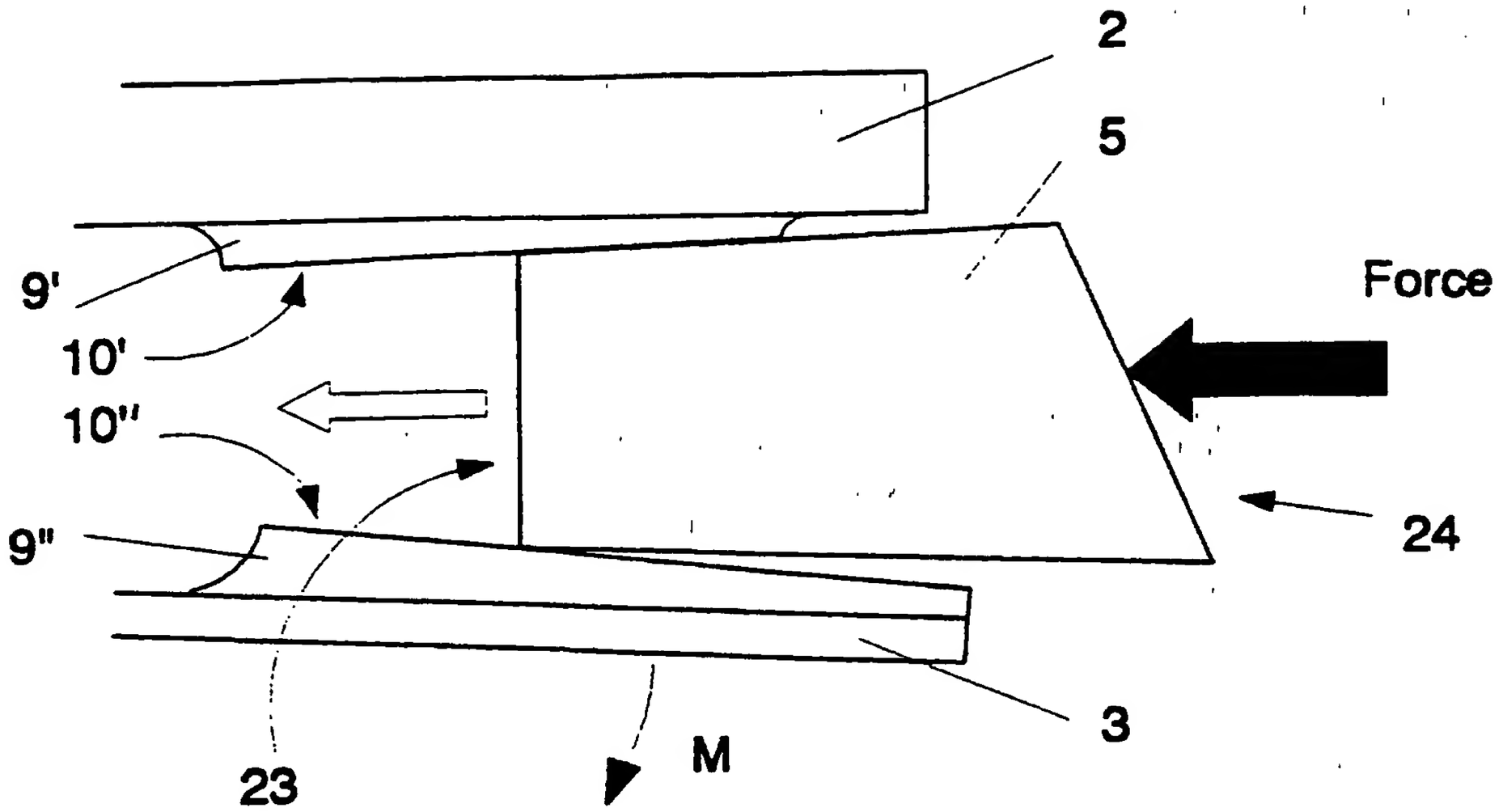
2
5
9'
10'
10''
9''
Force
24
3
23
M

Fig. 3

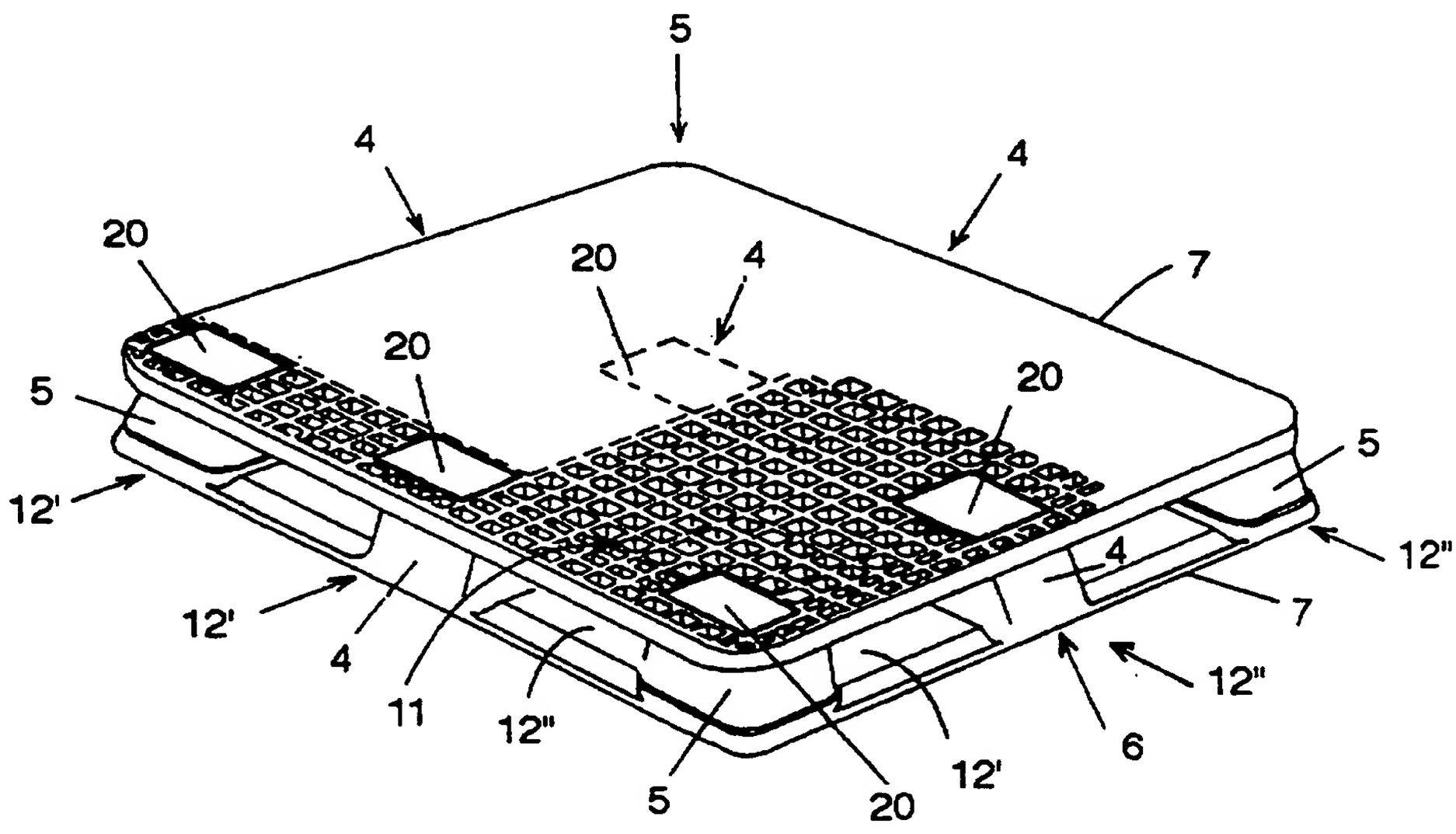
5
4
4
20
20
4
20
20
7
5
12'
5
12''
4
12'
7
4
11
12''
12''
6
5
20
12'

Fig. 4

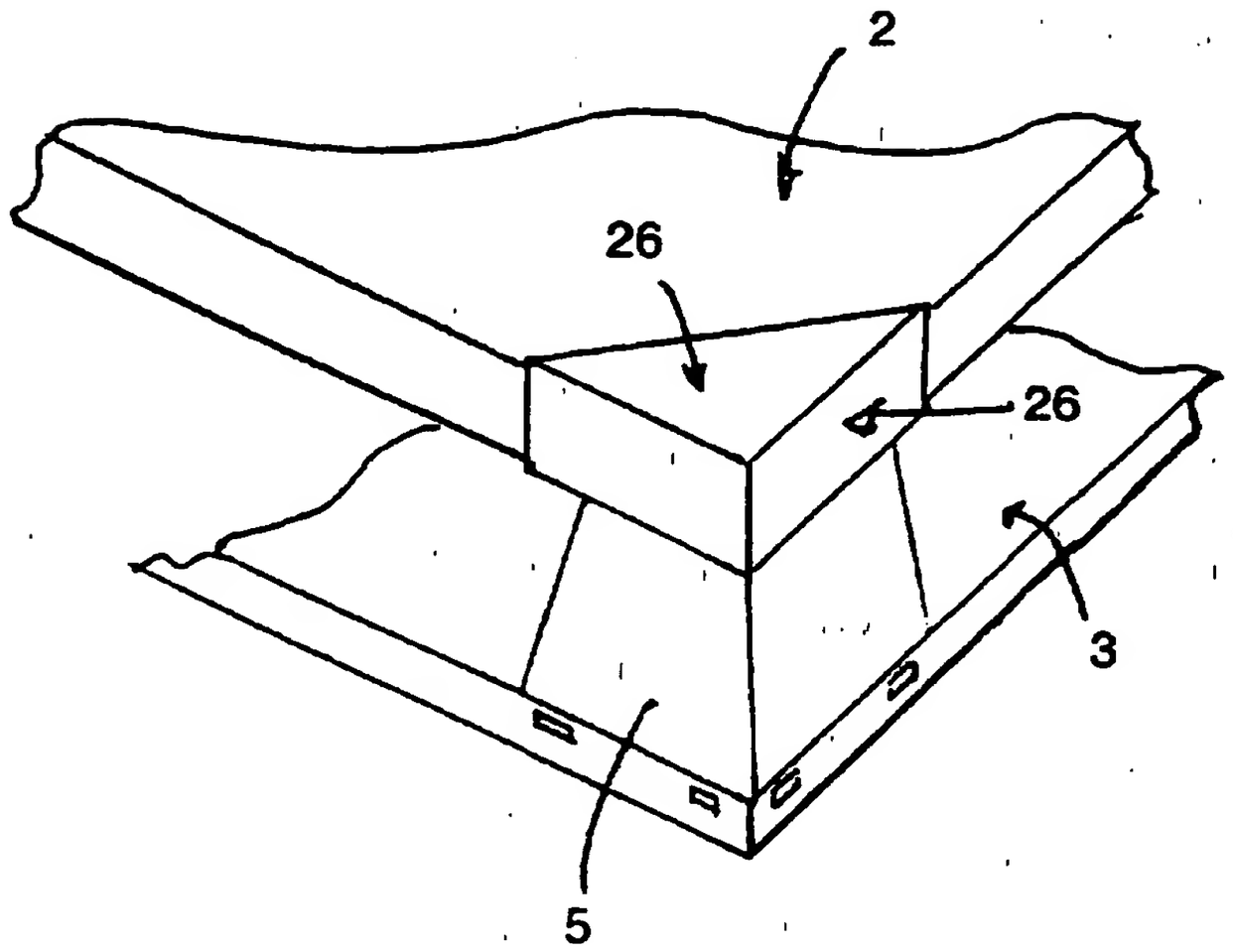

Fig. 5

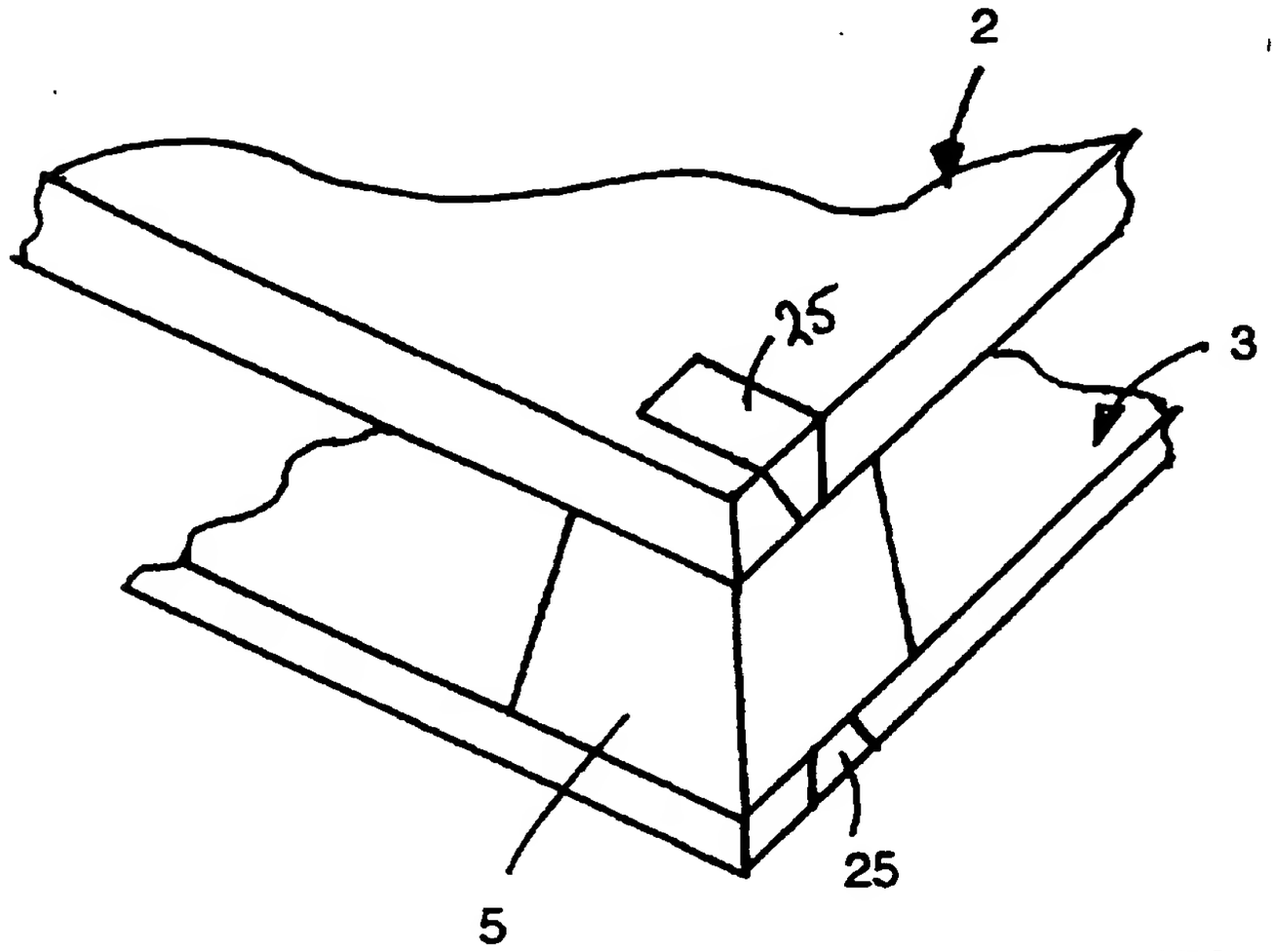

Fig. 5A

INTERNATIONAL SEARCH REPORT

Ir tional Application No
PCT/NL 95/00381

A. CLASSIFICATION OF SUBJECT MATTER
IPC 6 B65D19/32

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 6 B65D

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	EP 0 583 796 A (NUCON CORP.) 23 February 1994 cited in the application see the whole document	1,4,5, 11-15, 19,20
A	DE 91 13 329 U (STEGMAIER) 12 December 1991 see figures	1,4-6, 13-15, 19,20
A	US 5 351 627 A (SATRIA INT.) 4 October 1994 see column 5, line 28 - line 30; figure 9	1,7

☐ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
27 June 1996	09.10.96

Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	MARTIN A.G.M.

Form PCT/ISA/210 (second sheet) (July 1992)

INTERNATIONAL SEARCH REPORT

International application No.
PCT/NL95/00381

Box I Observations where certain claims were found unsearchable (Continuation of item 1 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:

2. ☐ Claims Nos.:
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:

3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box II Observations where unity of invention is lacking (Continuation of item 2 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

1. Claims 1,2-7, 11-21
2. Claims 8,9-10, 11-21

1. ☐ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.

2. ☐ As all searchable claims could be searches without effort justifying an additional fee, this Authority did not invite payment of any additional fee.

3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:

4. ☒ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

1,2-7; 11-21(partially)

Remark on Protest

☐ The additional search fees were accompanied by the applicant's protest.

☐ No protest accompanied the payment of additional search fees.

INTERNATIONAL SEARCH REPORT

Information on patent family members

Int onal Application No
PCT/NL 95/00381

Patent document cited in search report	Publication date	Patent family member(s)		Publication date
EP-A-583796	23-02-94	US-A-	4843976	04-07-89
		AU-B-	650837	30-06-94
		AU-A-	2617392	03-12-92
		AU-B-	628844	24-09-92
		AU-A-	4045889	05-03-90
		CA-A-	1330958	26-07-94
		DE-D-	68914159	28-04-94
		DE-T-	68914159	15-09-94
		EP-A-	0429498	05-06-91
		JP-B-	2518711	31-07-96
		JP-T-	4502743	21-05-92
		US-A-	5388533	14-02-95
		WO-A-	9001448	22-02-90
		US-A-	5197395	30-03-93
		US-A-	5343814	06-09-94
DE-U-9113329	12-12-91	EP-A-	0539698	05-05-93
US-A-5351627	04-10-94	NONE		